(Adopted: 08/27/07; Amended: 08/28/17)

Rule 1162
Polyester Resin Operations

(A) Purpose

(1) Purpose

(a) The purpose of this rule is to limit the emissions of Volatile Organic Compounds (VOCs) from Polyester Resin Operations, Fiberglass Boat Manufacturing Operations, organic solvent cleaning, and the storage and disposal of solvents and waste solvent materials associated with such operations.

(2) Applicability

(a) This rule is applicable to the manufacture of products from, or the use of, Polyester Resin Material, including Repair, rework, or touch-up activities for commercial, military, or industrial use.

(b) This rule is applicable to organic solvent cleaning, and the storage and disposal of all solvents and waste solvent materials associated with Polyester Resin Operations and Fiberglass Boat Manufacturing Operations.

(c) This rule is applicable to all new and existing operations.

(3) Exemptions

(a) The provisions of this rule, other than the record keeping requirements of subsection (D)(1), shall not apply to any Polyester Resin Operation where the volume of Polyester Resin Materials used is less than 20 gallons per month.

(b) The requirements of subsections (C)(1) and (C)(2) shall not apply to Pin-Striping provided that the total amount of the Gel Coat materials sprayed does not exceed one (1) gallon per day per facility.

(c) For Fiberglass Boat Manufacturing Operations, Production Resins (including Skin Coats) that must meet the specifications for use in military vessels or must be approved by the United States Coast Guard for use in the construction of lifeboats, rescue Boats, and other life-saving appliances approved under Title 46, Chapter 1, Subchapter Q of the CFR (commencing with §159), or to the construction of small passenger vessels regulated by Title 46, Chapter 1, Subchapter T of the CFR (commencing with §175) are exempt from the requirements of subsection (C)(3)(b).

Production Resins that meet these criteria shall be applied with non-atomizing Resin application equipment.

(d) The solvent cleaning provisions of subsection (C)(6) shall not apply to the following cleaning applications: solar cells, laser hardware, scientific instruments, high precision optics, laboratory tests and analyses, or bench scale or research and development projects.

(B) Definitions

The definitions contained in District Rule 102 – *Definition of Terms* shall apply unless the term is otherwise defined herein:

(1) Air-Assisted Airless Spray – A coating application system in which the coating fluid is supplied to the gun under fluid pressure and air is combined at the spray cap.

(2) Application Equipment – A device, including, but not limited to, a spray gun, brush, and roller, used to apply adhesives, coatings, or inks.

(3) Assembly Adhesive – A chemical used in joining fiberglass, metal, foam, or wood parts to another to form a temporary or permanently bonded assembly. Assembly Adhesives include, but are not limited to, methacrylate adhesives and putties made from Polyester or Vinylester Resin mixed with inert Filler or fibers.

(4) Atomized Resin Application – A Resin application technology in which the Resin leaves the application equipment and breaks into droplets or an aerosol as it travels from the application equipment to the surface of the part. Atomized Resin Application includes, but is not limited to, Resin spray guns and Resin chopper spray guns.

(5) Boat – Any type of vessel, other than a seaplane, that can be used for transportation on the water.

(6) Catalyst – A substance that is added to Resin to initiate or promote polymerization.

(7) Clear Gel Coat – A Gel Coat that is clear or translucent so that underlying colors are visible. Clear Gel Coat is used to manufacture parts for sale. Clear Gel Coat does not include Tooling Gel used to build or Repair Molds.

(8) Closed Molding System – A method of fabricating composite parts by placing composite materials in a confining Mold cavity and applying pressure and/or heat. The pressure may be clamping pressure, fluid pressure, atmospheric pressure, or vacuum pressure used either alone or in combination. The Mold surfaces may be rigid or flexible. Closed Molding includes, but is not limited to, compression molding with sheet molding compound, infusion molding, Resin Injection Molding (RIM), Vacuum-Assisted Resin Transfer Molding (VARTM), Resin Transfer Molding (RTM), and vacuum-assisted compression molding. Processes in which a closed Mold is used only to compact saturated fabric or remove air or

excess Resin from the fabric (such as in vacuum bagging) are not considered Closed Molding. Open molding steps, such as application of Gel Coat or Skin Coat layer by conventional open molding prior to a Closed Molding process are not Closed Molding.

(9) Corrosion-Resistant Materials – Polyester Resin Materials used to make products for corrosion resistant applications such as tooling, fuel or chemical tanks, Boat hulls, pools and outdoor spas.

(10) Cure – To transform or polymerize material from a liquid state to a solid or semi-solid state in which the desired physical properties, including hardness, are achieved.

(11) Fiber Reinforced Plastic or Composite (FRP/C) Materials – A mixture of Polyester Resin and Fiber Reinforcement Materials.

(12) Fiber Reinforcement Materials – Multifilament of glass or other fibrous materials such as, carbon, boron, metal and amid Polymers, which are used to reinforce plastic.

(13) Fiberglass Boat – A vessel in which either the hull or deck is built from a composite material consisting of a Thermosetting Polyester Resin matrix reinforced with fibers of glass, carbon, aramid, or other material.

(14) Fiberglass Boat Manufacturing Operations – Facilities that manufacture hulls or decks of Boats from fiberglass, or build molds to make Fiberglass Boat hulls or decks. Facilities that manufacture solely parts of Boats (such as hatches, seats, or lockers), or Boat trailers, but do not manufacture Boat hulls or decks from fiberglass or build Molds to make Fiberglass Boats or hulls are not considered Fiberglass Boat Manufacturing. A facility that manufactures hulls or decks, or Molds for hulls or decks, and other Fiberglass Boat parts, including small parts such as hatches, seats, and lockers, is considered Fiberglass Boat Manufacturing. Fiberglass Boat Manufacturing operation include open molding Resin and Gel Coat Operations (these include Pigmented Gel Coat, Clear Gel Coat, Production Resin, Tooling Gel Coat, and Tooling Resin), Resin and Gel Coat mixing operations, and Resin and Gel Coat application equipment cleaning operations.

(15) Filament Application – A method of applying Resin to an open mold that involves feeding reinforcement fibers through a Resin bath and winding the Resin-impregnated fibers on a rotating mandrel.

(16) Filled Polyester Resin Material – A material formulated by adding compatible filler(s) to Polyester Resin Material(s) to change viscosity, density, shrinkage, or other physical properties.

(17) Filler – A finely divided inert (non-VOC) material, which may be added to the Resin to enhance its mechanical properties and extend its volume. Resin Fillers include, but are not limited to, silica, carbon black, talc, mica and calcium carbonate.

(18) Fire Retardant Materials – Polyester Resin Materials used to make products that are resistant to flame or fire.

(19) Flowcoater – A non-atomizing application technique of applying Resins and Gel Coats to an open mold with a fluid nozzle in a fan pattern with no air supplied to the nozzle.

(20) Fluid Impingement Technology – A spray gun that produces an expanding non-misting curtain of liquid by the impingement of low-pressure uninterrupted liquid streams.

(21) Gel Coat – A Thermosetting Polyester Resin surface coating containing styrene or methyl methacrylate, either pigmented or clear, that provides a cosmetic enhancement and improves resistance to degradation from exposure to the elements. Gel Coat layers do not contain any reinforcing fibers and Gel Coats are applied directly to Mold surfaces or to a finished laminate.

(22) General Purpose Polyester Resins – Resin materials that are not Corrosion-Resistant, Fire Retardant, high strength, or Gel Coats.

(23) Grams of VOC Per Liter of Material – The weight of VOC per volume of material, calculated using the formula in subsection (E)(1)(a).

(24) Hand Lay-Up – Hand application technique of composite materials using a bucket and a paint brush or a paint roller, or other hand held method of application.

(25) High-Strength Materials – Polyester Resins which have casting tensile strength of 10,000 psi or more and which are used for manufacturing of high performance products, including Boats and skis.

(26) Lamination Resins – Orthophthalate, isophthalate and dicyclopentadiene (DCPD) Resins which are used in composite system made of layers of reinforcement fibers and Resins, such as in Boat fabrication.

(27) Manual Application – The application of Resin to an Open Mold using a Hand Lay-Up technique. Components of successive plies of Resin-impregnated reinforcement fibers are applied using hand tools such as brushes and rollers. The use of Pressure-Fed Rollers and Flowcoaters to apply Resin to glass reinforcements that are then applied by hand to the Mold is not considered Manual Resin Application.

(28) Marble or Cultured Resins – Orthophthalate and modified acrylic isophthalate Resins, which are designed for the fabrication of cast products, such as vanities.

(29) Mold – The cavity or surface into or on which Gel Coat, Resin, and fibers are placed and from which finished fiberglass parts take their form.

(30) Monomer – A VOC that partially combines with itself, or other similar compounds, by a cross-linking reaction to become a part of the Cured Resin. Monomers include, but are not limited to, styrene and methyl methacrylate.

(31) Monomer Percent by Weight of a Filled Resin as Applied – The weight of the Monomer, divided by the weight of the polymer and Filler(s).

(32) Monomer Percent by Weight of a Resin – The weight of the Monomer, divided by the weight of the Polymer.

(33) Non-Atomizing Spray Application – Any application technique in which Resin flows from the applicator, in a steady and observable coherent flow, without droplets, for a minimum distance of three (3) inches from the applicator orifices. Non-Atomized Resin Application technology includes, but is not limited to, Flowcoaters, chopper Flowcoaters, pressure fed Resin rollers, Resin Impregnators, Fluid Impingement Technology applicators. Non-Atomizing application of Resin to glass reinforcements that are then applied by hand to the Mold are considered to be Non-Atomizing resin application.

(34) Open Molding Resin and Gel Coat Process – A process in which the reinforcing fibers and Resin are placed in the mold and are open to the surrounding air while the reinforcing fibers are saturated with Resin. For the purpose of this rule, open molding includes operations in which a vacuum bag or similar cover is used to compress the uncured laminate to remove bubbles or excess Resin, or to achieve a bond between core material and a laminate.

(35) Open Molding System – A process for fabricating composites in a way that Polyester Resin Materials are exposed to the atmosphere. Open molding includes processes such as manual resin application, mechanical resin application, filament application, and gel coat application. Open molding also includes application of resins and gel coats to parts that have been removed from the open mold.

(36) Overall Control Efficiency (CE) – The ratio, expressed as a percentage, of the weight of VOC removed by the emission control system to the total weight of VOC emitted from the Polyester Resin Operation, both measured simultaneously, calculated pursuant to the formula found in subsection (E)(1)(b).

(37) Pigmented Gel Coat – Opaque Gel Coat that does not contain ten percent (10%) or more titanium dioxide by weight used to manufacture parts for sale. Pigmented Gel Coat does not include Tooling Gel used to build or Repair Molds.

(38) Pin-Striping – A spray application technique used to apply one or more narrow bands, marks, or streaks of Gel Coat onto the surface of an open mold of a composite product.

(39) Polyester – A Polymer of ester molecules, which are formulated by the reaction of an acid and an alcohol and linked together by the ester linkages.

(40) Polyester Resin Materials – Polyester Resins, such as isophthalic, orthophthalic, halogenated, bisphenol A, vinyl ester, or furan Resins; cross-linking agents; Catalysts; Gel Coats; inhibitors; accelerators; promoters; and any other material containing VOC used in Polyester Resin Operations.

(41) Polyester Resin Operations – Fabricate, rework, Repair, or touchup products for commercial, military, or industrial use by mixing, pouring, Hand Lay-Up, impregnating, injecting, forming, winding, spraying, and/or curing with fiberglass, Fillers, or any other reinforcement materials and associated cleanup.

(42) Polymer – A chemical compound, such as polystyrene, comprised of a large number of chemical units (Monomer) composed of identical crosslinking groups, such as styrene.

(43) Polyputties – Polyester Resin Putties used for assembling fiberglass parts.

(44) Pressure-Fed Roller – A fabric roller that is fed with continuous supply of catalyzed Resins from a mechanical fluid pump.

(45) Primer Gel Coat – Gel Coat that is used to coat the surface of composite parts, prior to top-coat painting, for automotive, aerospace, marine and home building industries.

(46) Production Resin – A General Purpose Polyester Resin or Gel Coat Material that is not especially Corrosion-Resistant, Fire Retardant, or High-Strength.

(47) Pultrusion – A process where continuous roving strands are moved through a strand-tensioning device into a Resin bath for impregnation and then passed through a heated die for curing. There are several types of Pultrusion equipment such as open bath, Resin injection, and direct die injection equipment.

(48) Putty(ies) – A thickened mixture of polyester resin made by adding fillers, thixotrophs and reinforcing fibers used in the joining of one fiberglass, metal, foam or wood part to another to form a temporary or permanently bonded assembly.

(49) Repair – Application of resin or gel coat to a part to correct a defect or mend damage, where the resin or gel coat application occurs after the part has gone through all the steps of its typical production process, or the application occurs outside the normal production area. For purposes of this definition, rerouting a part back through the normal production line, or part of the normal production line, is not considered repair.

(50) Resin – Any Thermosetting Polyester Resin, which is used to encapsulate and bind together reinforcement fibers and/or Fillers in the formulation of composite materials.

(51) Resin and Gel Coat Operation – An operation in which Resin or Gel Coat, including the mixing of putties or polyputties, is combined with additives that include, but are not limited to, Fillers, promoters, or Catalysts.

(52) Resin Impregnator – A mechanical non-atomizing composite materials application technique in which fiber reinforcement is saturated with Resins in a controlled ratio for each specific composite product.

(53) Skin Coat – A layer of resin and fibers applied over Gel Coat to protect the Gel Coat from being deformed by the next laminate layers.

(54) Solid Surface Resins – Resins, which are used without Gel Coats to fabricate homogenous solid surface products.

(55) Specialty Gel Coats – Gel Coats which are used in conjunction with Fire Retardant, Corrosion-Resistant or High-Strength Materials.

(56) Specialty Resin – A halogenated, furan, bisphenol A, vinyl-ester, or isophthalic Resin used to make products for exposure to one or more of the following extreme environmental conditions: acute or chronic exposure to corrosive agents, caustic agents, acidic agents, or flame.

(57) Thermosetting Polyester Resin – A Resin material that undergoes a chemical reaction during curing and cannot be reshaped.

(58) Tooling Gel Coat – The Gel Coat used to build or Repair Molds (also known as tools) or prototypes (also known as plugs) from which Molds will be made.

(59) Tooling Resin – The Resins used to build or Repair Molds (also known as tools) or prototypes (also known as plugs) from which the Molds will be made.

(60) Tub/Shower Resins – Dicyclopentadiene (DCPD) Resins, along with orthophthalate and isophthalate Resins, which are used to fabricate bathware products.

(61) Vapor Suppressed – A polyester Resin or Gel Coat material which contains additives to reduce VOC evaporation loss to less than fifty (50) grams per square meter of surface area as determined and certified by Resin and Gel Coat manufacturers.

(62) Vinylester Resin – A Thermosetting Polyester Resin containing esters of acrylic or methacrylic acids having a double-bond and ester linkage sites at the end of the Resin molecules.

(63) White and Off-White Gel Coat – A Gel Coat that contains ten percent (10%) or more titanium dioxide by weight.

(C) Requirements

(1) An operator of a Polyester Resin Operation shall comply with one of the following process or control requirements:

(a) Use materials in an Open Molding process that comply with the limits in Table 1. In addition to complying with Table 1 limits, the non-Monomer VOC content of each Resin and Gel Coat shall not contain more than five percent (5%) by weight of the Resin or Gel Coat; or comply with subsections (C)(1)(b), (C)(1)(c), or (C)(1)(d).

Table 1* Monomer Content for Open Molding Resin and Gel Coat	
Material	Weight Average Monomer VOC content (weight percent) limit
General Purpose Polyester Resin	
Marble Resin	10 % (32% as supplied, no Fillers)
Solid Surface Resin	17%
Tub/Shower Resin	24% (35% as supplied, no Fillers)
Lamination Resin	31% (35% as supplied, no Fillers)
Tooling Resin	
Atomized (spray)	30%
Non-atomized	39%
Specialty Resin	
Fire Retardant	38%
High Strength*	
Mechanical (non-atomizing)	46.2%
Filament Application	42%
Manual Application	40%
Corrosion Resistant	48%
All other Resin	35%
Tooling Gel Coat	40%
Pigmented Gel Coat	
White and Off -White	30%
Non-white	37%
Primer	28%
Clear Gel Coat	
Marble Resin	40%
Other Resin	44%
Specialty Gel Coat	48%

*Facilities that apply High Strength Resins using non-atomized mechanical application may use the same resin for manual application during product assembly and/or reinforcement tie-ins, provided that the High Strength Resin used for both application methods does not exceed the 46.2% monomer content limit.

(b) Use Resin containing a vapor suppressant, such that the weight loss from the VOC emissions does not exceed 50 grams per square meter of exposed surface during Resin polymerization; or

(c) Use a Closed-Mold system; or

(d) Install and operate a VOC control system which meets all of the requirements of subsections (C)(1)(d)(i), (C)(1)(d)(ii), and (C)(1)(d)(iii) during periods of emission producing activities.

(i) The VOC emission control system shall be approved, in writing, by the APCO.
(ii) The VOC emission control system shall have an overall capture and control efficiency of at least 90 percent by weight, demonstrated using the applicable test method(s) in Section (E).
(iii) The VOC emission control system shall reduce VOC emissions, at all times, to a level not greater than the emissions that would have been achieved through the use of compliant materials, compliant equipment, or compliant work practices, as applicable.

(e) Resins and Gel Coats used for Touch-up, Repair, or small jobs, may have a Monomer content limit up to ten percent (10%) more than the applicable limit in Table 1. Such Resins or Gel Coats shall only be applied by a hand-held atomized spray gun which has a container no larger than one (1) quart for the Resin or Gel Coat as part of the gun. Resins or Gel Coats applied by another method shall comply with the applicable limit in Table 1. Total material use for all small jobs at a facility shall not exceed two (2) gallons per day.

(f) Complying formulations shall not be thinned or diluted with any VOC containing material or changed in any manner that may increase VOC emissions after testing, but prior to or during application.

(2) Application Technique

(a) Except for Gel Coats, a person shall not apply any Resin materials to an open Mold surface subject to the provisions of this rule unless one of the following non-atomizing application techniques is used and operated according to the manufacturer's specifications:

(i) Non-atomizing Spray Application technique;
(ii) Flowcoaters;
(iii) Pressure-Fed Rollers;
(iv) Resin Impregnators:
(v) Hand Lay-Up applications; or
(vi) Other non-atomizing application techniques which have transfer efficiencies at least equal to one of the above methods, and which are used in a manner that the parameters under which they were tested are permanent features of the method. Prior to their use, such application shall be approved in writing by the APCO, CARB, and the USEPA.

(b) An operator shall not apply Gel Coat materials to any open Mold surface subject to the provisions of this rule unless one of the following application techniques is used and operated according to the manufacturer's specifications:

(i) Any non-atomizing application technique listed in subsection (C)(2)(a);
(ii) Airless;
(iii) Air-Assisted Airless Spray;
(iv) Electrostatic Attraction; or
(v) High-Volume, Low-Pressure (HVLP).
a. HVLP spray equipment shall be operated in accordance with the manufacturer's recommendations.
b. HVLP spray guns shall have the maximum inlet air pressure in psig at which the gun will operate within the parameters specified in Rule 102 – *Definitions of Terms* indicated on the spray gun.

(c) In lieu of complying with the applicable requirements of subsection (C)(2), an operator may install and maintain a VOC emission control system that meets the requirements of subsection (C)(1)(d) around the coating application equipment.

(3) Fiberglass Boat Manufacturing Operation

An operator of a Fiberglass Boat Manufacturing Operation shall comply with one of the following process or control requirements:

(a) Requirements for Closed Molding Process

(i) An operator of a Fiberglass Boat Manufacturing Facility which uses a Closed Molding process shall comply with the applicable requirements of subsections (C)(1), (C)(4), (C)(5) and Sections (D) and (E).

(b) Requirement for Compliant Materials

(i) An operator subject to (C)(3) shall not use any materials in an Open Molding process that exceed the limits in Table 2. In addition to complying with Table 2 limits, the non-Monomer VOC content of each Resin and Gel Coat shall not contain more than five percent (5%) by weight of the Resin or Gel Coat.

Table 2 Monomer VOC Limits for Open Molding Resin and Gel Coat for Fiberglass Boat Manufacturing Operations		
Material	Application Method	Weight Average Monomer VOC content (weight percent) limit
Production Resin	Atomized (spray)	28%
Production Resin	Non-atomized	35%
Pigmented Gel Coat	Any method	33%
Clear Gel Coat	Any method	48%
Tooling Resin	Atomized (spray)	30%
Tooling Resin	Non-atomized	39%
Tooling Gel Coat	Any method	40%

(c) Requirements for Add-on VOC Control System

(i) In lieu of complying with limits of Table 2, an operator may install and operate a VOC control system which meets all of the requirements of subsections (C)(1)(d) during periods of emission producing activities.

(4) Process Requirements

(a) A person shall not operate a Closed Molding System, unless the weight loss of Polyester Resin Materials during polymerization is less than four percent (4%).

(b) A person shall not perform a Pultrusion operation, unless Resin baths are covered except for 18 inches from the exit of the bath to the die. The weight loss of Polyester Resin Materials during polymerization shall be no less than three percent (3%) in a Pultrusion operation.

(5) Work Practice Standards

(a) Any person processing Polyester Resin Materials and any other VOC containing materials, including putties and polyputties, shall keep these materials in closed containers with tightly fitting lids, except when manually filling or emptying the container, or when mixing or pumping equipment is being placed in or removed from a container.

(6) Organic Solvent Cleaning Requirements

A person shall not use VOC-containing materials for cleaning or clean-up, excluding mold sealing and release agents, mold stripping and cleaning, cleaners

used to clean cured resin from Application Equipment, and closed systems, unless:

(a) The VOC content composite partial pressure is 45 mm Hg or less at a temperature of 20 degrees C, or

(b) The material contains 25 grams or less of VOC content per liter of material (0.21 pounds per gallon), as applied.

(c) In lieu of complying with the VOC content limits in (C)(6)(a) or (C)(6)(b), an operator may control VOC emissions from cleaning operations with an approved VOC emission control system that meets the requirements of subsection (C)(1)(d) for the solvent cleaning operations.

(7) Prohibition of Specification

(a) No person shall solicit or require for use or specify the application of a Polyester Resin Material, or part or component thereof, if such use or application results in a violation of the provision of this rule. The prohibition of this subsection shall apply to all written or oral contracts under the terms of which any Polyester Resin Material, or any part or component, subject to the provisions of this rule is applied at any physical location within the District.

(8) Prohibition of Sale

(a) A person shall not offer for sale or sell within the District any Polyester Resin Material that does not meet the VOC content limits as set forth in Table 1 or 2 of this rule. The prohibition of this section shall apply to the sale of any Polyester Resin Material which will be applied at any physical location within the District, except those materials specifically exempted as an Exempt Compound as defined in Rule 102 – *Definition of Terms* and Section (C) of this rule.

(9) Compliance Statement Requirement

(a) The manufacture of materials subject to this rule shall include a designation of VOC as supplied on data sheets; including material components, expressed in grams per liter or pounds per gallon, excluding water and exempt compounds.

(D) Monitoring and Records

(1) Material Records

(a) A person subject to the provisions of this rule (or, a person subject to Section (C) or claiming exemption under subsection (A)(3)) shall maintain daily records. Alternately, records may be kept on a monthly basis provided the polyester Resin process or equipment is not subject to a daily production limit or daily VOC limit in any applicable district rule(s) or

permit(s). The records shall contain the following information, if applicable:

(i) The type of non-atomizing, or other in the case of Gel Coat, application technique(s) used, manufacturer's name, and records of the fluid tip pressure calibration as specified by the manufacturer;

(ii) A current list of Polyester Resin Materials in use which provides the material data necessary to evaluate compliance, including the following information, if applicable:

1. The manufacturer's name;
2. The type and amount of each of the Polyester Resin Materials used;
3. The weight (in percent) of Monomer for all Polyester Resin Materials and Filler(s);
4. If VOC-containing materials are added to the Polyester Resin Materials, the amount of VOC-containing materials, in liters, and the VOC content in grams per liter, of VOC-containing materials.

(iii) Certifications of analysis from the Polyester Resin manufacturer(s) to verify that all applied Polyester Resin materials are Vapor Suppressed as applicable.

(iv) For closed Mold and Pultrusion systems, the weight loss (in percent) of Polyester Resin Materials for each application.

(b) Records for solvents used in cleanup and preparation

(i) Type and quantity of all cleaning materials;

(ii) VOC content of all cleaning material used and stored.

(2) Compliance Assurance Monitoring

(a) Each Coating Application Operation subject to subsection (C)(1) which is using air pollution abatement equipment to meet the control requirement shall:

(i) Utilize Compliance Assurance Monitoring, as approved by the APCO. Each monitoring device(s), mechanism and/or technique shall be calibrated/maintained as recommended by the manufacturer; and

(ii) Maintain and produce daily records of key system operating parameters and maintenance procedures which will demonstrate continuous operation and compliance of the air pollution abatement equipment during periods of emissions-producing activities. Key system operating parameters are those necessary to ensure compliance with VOC content of coating requirements, such as temperatures, pressures and flow rates.

(b) Compliance with subsection (C)(1) shall be determined by compliance testing as prescribed in subsection (E)(2) and/or by evaluating Compliance Assurance Monitoring data.

(3) All records for the previous five (5) year period maintained and produced pursuant to this Section shall be retained and available for inspection by the APCO upon request.

(E) Compliance Procedures and Test Methods

(1) Calculation Methods

The following test methods and procedures shall be used to determine compliance with this rule. Other applicable test methods may be used if they are determined to be equivalent and approved in writing by the APCO, CARB and the USEPA.

(a) Grams of VOC Per Liter of Material shall be determined by the following equation:

$$G_v = \frac{W_s - W_w - W_{es}}{V_m}$$

Where:

G_v = Grams of VOC per liter of coating less water and less Exempt Compounds

W_s = weight of volatile compounds in grams

W_w = weight of water in grams

W_{es} weight of Exempt Compounds in grams

V_m = volume of material in liters

(b) Overall Control Efficiency shall be determined by the following equations

$$CE = \frac{(W_c - W_a)}{W_e} x100$$

$$CE = \frac{(CaptureEfficiency)x(ControlDeviceEfficiency)}{100}$$

Where:

W_c = weight of VOC entering control device

W_a = weight of VOC discharged from the control device

W_e = weight of VOC emitted, determined by the appropriate USEPA calculation in 40 CFR 63, Subpart VVVV, or 40 CFR 63, Subpart WWWW, or any other method approved by the APCO, CARB, and the USEPA

(c) Determination of VOC content of VOC-containing materials

(i) United States Environmental Protection Agency (USEPA) Reference Method 24 (40 CFR 60, Appendix A) for VOC content and ASTM D4457-85, or CARB Method 432 for determination of Exempt Compounds. The Exempt Compound content shall be determined by SCAQMD Method 303 *Determination of Exempt Compounds* contained in the SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" manual;

(ii) SCAQMD Method 302 and 303 – *Determination of Exempt Compounds*;

(iii) SCAQMD Method 304 – *Determination of Volatile Organic Compounds (VOCs) in Various Materials*, or any other applicable method approved by the SCAQMD, CARB, and the USEPA;

(iv) SCAQMD Method 309 – *Determination of the Weight Loss of Polyester Resin Materials*;

(v) SCAQMD Method 312 – *Determination of Monomer Content of Polyester Resins*; or

(vi) SCAQMD Method 313 – *Determination of Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry*.

(d) Determination of Efficiency of Emission Control System

(i) The efficiency of the collection device of the emission control system as specified in paragraph (C)(1)(d) shall be determined according to USEPA's "Revised Capture Efficiency Guidance for Control of Volatile Organic Compound Emissions" (February 7, 1995) and 40 CFR 51 Appendix M, Test Methods 204-204F, as applicable, or any other method approved by the APCO, CARB, and the USEPA.

(ii) The efficiency of the control device of the emission control system as specified in paragraph (C)(1)(d) and the VOC content in the control device exhaust gases, measured and calculated as carbon, shall be determined by using:

a. EPA Test Methods 25 – *Determination of Total Gaseous Nonmethane Organic Emissions as Carbon*;

b. EPA Method 25A – *Determination of Total Gaseous Organic Concentration Using a Flame Ion Analyzer*,

c. SCAQMD Method 25.1 – *Determination of Total Gaseous Non-Methane Organic Emissions as Carbon February 1991*); or

d. SCAQMD Test Method 25.3 – *Determination of Low Concentration Non-Methane Non-Ethane Organic Compound Emissions from Lean Fueled Combustion Sources (March 2000)*.

(e) Determination of Exempt Compounds - Exempt Compound content shall be determined by using:

(i) EPA Test Method 18 – *Measurement of Gaseous Organic Compound Emissions by Gas Chromatography*;

(ii) ARB Method 422 "*Determination of Volatile Organic Compounds in Emissions form Stationary Sources*" (January 22, 1987) shall be used to determine emissions of Exempt Compounds.

a) It is only approved for the compounds listed in Method 422, section 2, that have been exempted from USEPAs definition of VOC; and

b) If aqueous impingers are used, the solution also shall be analyzed for the target VOCs; or

(iii) SCAQMD Method 303-91, "*Determination of Exempt Compounds*" (February 1993).

(f) Determination of Transfer Efficiency

(i) Demonstration of transfer efficiency of alternative application methods subject to subsection (C)(2)(a)(vi) shall be conducted in accordance with SCAQMDs "Spray Equipment Transfer Efficiency Test Procedure for Equipment User" (5/24/89).

(g) The emission rate per square meter of exposed surface during polymerization of Polyester Resins is to be determined using SCAQMD Method 309 Static Method for Determination of Volatile Emissions from Polyester and Vinyl Resins Operations, Attachment A, 01/08/1991.

(2) All test methods referenced in this section shall be the most recently USEPA approved version.

(3) Alternative Test Methods

(a) Other test methods demonstrated to provide results that are acceptable for purposes of determining compliance with any provisions of this rule may also be used after review and approval in writing by the APCO, CARB and the USEPA.

(4) Alternative Compliance Methods

(a) Alternative application processes and materials other than those listed in Section (C) may be used, provided they result in equivalent VOC emissions, and are approved in writing by the APCO, CARB and the USEPA.

(F) Violations

(1) Failure to comply with any provision of this rule shall constitute a violation of the rule.

(2) A violation of the limits contained in this rule as determined by any one of these test methods shall constitute a violation of this rule.

(3) When more than one test method or set of test methods are specified for any testing, a violation of any requirement of this rule established by any one of the specified test methods or set of test methods shall constitute a violation of the rule.

[SIP: See SIP Table at http://www.mdaqmd.ca.gov]

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